Baltimore Harbor TMDL Stakeholder Advisory Group (SAG)
March 4, 2003 Meeting Minutes

Maryland Department of the Environment
Montgomery Park
Baltimore, Maryland
8:30-12:00

Overview:

The meeting included presentations on the proposed sediment endpoints for the toxics TMDLs, and an overview of the tasks remaining – including a proposed schedule, and a review of topics for which MDE is expecting SAG input to help complete.

Presentations

Proposed Sediment Endpoints for Toxic TMDLs (Joseph Beamen)

- Topic – Review of 1998 303(d) listing methodology.

Goal: Provide data used to list Harbor segments as impaired and an overview on use of weight of evidence – Sediment Triad – assessment method.

- Topic – Review of proposed water quality endpoints for the toxic metals TMDL analyses, which include sediment quality.

Goals: Provide an understanding that water quality endpoints for the TMDL analysis must be consistent with the endpoints used in making impairment determinations for toxic metals during the 2002 303(d) listing process. Explain the rationale for using sediment chemistry endpoints for conducting TMDL analyses for metals in Baltimore Harbor. The proposed endpoints for the TMDL analyses are both an arithmetic average of the ERM Quotient ≤ 0.5 for sediments within a segment (i.e., a spatially averaged bottom sediment concentration of less than or equal to the one-half the ERM), and a maximum value of 2-times the ERM. These proposed endpoints apply independently for each of the three metals.

- Topic – Review Mean Effects Range Median – Quotient (Mean ERM-Q) Calculation.

Goal: Provide a detailed explanation of the sediment quality threshold MDE is proposing as an endpoint for toxic metals TMDL analyses in Baltimore Harbor. This was conducted by reviewing how the Mean ERM-Q was developed (research paper made available for review), and by providing an example of the calculation in Bear Creek. The link between how the Mean ERM-Q threshold relates a sediment concentration to a probability of toxicity was discussed.

Proposed Sediment Concentration Endpoints for Toxic Metals TMDL Analyses
(mg/kg dry weight)

Substance	ERM Concentration	Threshold for Average Concentration (Mean ERM-Q)	Threshold for Maximum Concentration (2x ERM)
Chromium	370	185	740
Lead	218	114	436
Zinc	410	205	820

Result: Based on the endpoint presentation, several issues were highlighted as points of concern:

1) The probability of toxic effects associated with the proposed sediment endpoint, an ERM-Q = 0.5, is equal to approximately 20%. Why was this chosen? The ERM – Q level seems low and may need adjusting if possible.

   Response: The ERM-Q threshold of 0.5 was set, in combination with other considerations, to support the designated use of protecting aquatic life from toxic effects. The ERM-Q threshold was based on the probability of toxic effects documented in the Long and MacDonald paper regarding the evaluation of toxicity in marine and estuarine sediments (21% probability of toxicity[1]). This threshold was chosen in consideration of mortality that occurs naturally in uncontaminated toxicity test control samples. The ERM-Q threshold level of 0.5 was included in the 303(d) listing methodology for toxic metals. It is important to note that sediment chemistry was only one of several factors used in the weight-of-evidence methodology for making listing decisions for toxic substances. The listing methodology was made available for public comment last year as part of Maryland's process of developing the 2002 303(d) list, thereby reaching formal closure on using the ERM-Q threshold of 0.5. (See response to Question 2 immediately below).

2) Given that the ERM values are not numeric criteria, does MDE have any concern using these values?

   Response: As noted above, the Department based its determination of impairment on a weight-of-evidence approach. Sediment chemistry values are only one of several factors that were considered. Other factors included water column concentrations, toxicity tests of the sediments, and assessments of the integrity of the benthic aquatic life. The use of a weight-of-evidence approach, in which a number of separate factors buttress each other, provides additional confidence in the decision making process.

   In proposing to use the sediment concentration thresholds alone in the TMDL analysis, the Department acknowledges some uncertainty; however, this uncertainty is balanced by another consideration that is part of the general water quality management strategy under consideration. In the future, as the bottom sediment concentrations of metals decline over time, toxicity tests will be conducted periodically as a direct measure of meeting the standards. If the future toxicity tests show no toxicity, then the water quality standards are being achieved, regardless of whether or not the sediment chemistry concentrations are above the ERM-Q of 0.5.

   At the present time, the Department is proposing the methodological considerations described above as the best way of advancing the TMDL analyses for metals in the Baltimore Harbor. Within the timeframe of the pending TMDL analysis, the Department will consider alternative ideas offered by SAG members and others.

3) How was MDE able to attribute the cause of toxicity to the metals listed in the impairment, given the presence of many chemicals in the sediment?

   Response: The toxicity tests conducted by the Department do not attempt to isolate the separate effects of individual types of metals. The Department has compared sediment chemistry data with sediment toxicity tests for separate segments in the Baltimore Harbor. These comparisons demonstrate an inverse relationship between higher sediment metals concentrations and lower amphipod survival rates. Within the limits of existing data, this supports attributing toxic effects to the metals, which is consistent with the research literature used to set the specific threshold concentration discussed above.

The potential confounding effects of other non-metal toxics substances were also considered. PCBs are generally not associated with short-term toxic effects. Thus, although PCBs were present at elevated levels in some samples, it is unlikely that they would confound the toxicity tests conducted on the sediments, which only assess short-term effects. Thus, in summary, the metals are implicated by research findings presented in the literature, the presence of each individual metal in high concentrations, the positive toxicity test results, and the elimination of other possible causes (e.g., PCBs). Although this does not eliminate all uncertainty, the Department thinks that a reasonable balance is being achieved, as discussed in the response to Question 2 above.

4) How does MDE relate the sediment endpoints to water quality standards?

Response: The water quality standard that is applicable in this situation provides for no toxicity to aquatic organisms resulting form anthropogenic sources (COMAR 26.08.02.03), which includes the bottom dwelling aquatic life. Thus, a sediment triad analysis, which includes biological community structure, sediment toxicity, and sediment chemical concentration, is used to assess the water quality standards. However, of these three elements, only the sediment chemical concentration can be modeled adequately. The ERM Quotient provides a means of relating toxic impacts observed in aquatic organisms to sediment concentrations present at the same site. Therefore, in the process of conducting the TMDL analysis in Baltimore Harbor, we propose using the bottom sediment concentrations to serve as TMDL endpoints. (See Response to Question 2 above).

5) Would the agency incorporate additional chromium data into the TMDL analysis if it were available?

Response: The Department is willing to review and possibly incorporate any available data into the analysis if it is made available in a timely manner.

Status Update on TMDL Task Completion and Schedule Update (Scott Macomber)

- Review of major tasks required for the completion of a TMDL analysis

Goal: Describe the major components that constitute a TMDL analysis, and provide an update on the current level of completion. Provide updated schedule based on current progress and remaining tasks to be completed prior to submission of the TMDL to EPA in December 2003.

Result: Based on the discussion between stakeholders and MDE, several issues were highlighted as points of concern:

1) As a method to differentiate between legacy pollutants and the effects of current loads. Can the models be run with initially clean sediments and current loading rates to determine if the current loads would impair the sediments?

Response: Yes, the models can be run to test this hypothesis.

2) Does the sediment transport model account for mixing of sediment on the Harbor floor? How does the model account for the deposition of cleaner sediment on the surface of the Harbor floor? Scenario approach recommendation: Run the model to simulate how long it would take for current sediment loads, when mixed with contaminated in situ sediment, to reach a concentration levels equal to the sediment thresholds for the impairing substances.

Response: Yes, the hydrodynamic/sediment transport model includes physical processes like resuspension and deposition that simulates mixing. Meanwhile, the water quality model incorporates chemical reactions like sorption and desorption that simulate interactions between sediment particles that contain contaminants of different concentrations. Taken in concert, these models will allow MDE to predict the movement and chemical behavior of the contaminants of interest.

3) Is MDE going to use a statistically based approach to calculate the loading caps? It was recommended that MDE investigate the approach used in NY/NJ Harbor regarding the development of caps.

   Response: MDE requested information from the stakeholder regarding the statistically based approach suggested. Further investigation is needed to determine applicability to the Baltimore Harbor effort.

4) Does MDE have a policy or process to ensure that the constituents being modeled will be appropriately correlated to facility permit limits during the TMDL allocation process?

   Response: MDE will ensure that those facilities discharging the impairing substance will be included in the allocation. Facilities with NPDES permits are regulated based on technology standards and local water quality standards. If a TMDL is written for a constituent not included in a facility NPDES permit, the permit will be amended to include the additional constituent. Facilities whose NPDES permit includes the impairing substance will be reviewed to determine if the TMDL allocation is below the approved permit discharge level and therefore would require amendment. If the TMDL allocation is above the NPDES approved level then the permitted discharge level will not be reduced. However, if the TMDL allocation is below the currently permitted discharge level, the permit will be amended to reduce the approved discharge level and reflect the change based on the TMDL.

- Review upcoming schedule based on completion of models and December submission.

  Goal: Provide overview of schedule for remainder of year – see below

Month	**Tasks to be Completed**
March	Finalize model development & run scenarios
April/May	Finalize scenarios & develop loading caps
May/June	Develop Loading Limits & Allocations
July	Draft report
August	Begin review process

Action Items:

- ❖ MDE will develop a list of initial scenario runs for review by the SAG.
- ❖ MDE will review the information regarding the allocation procedure used in NY/NJ Harbor and report back to the SAG with its findings.
- ❖ MDE will review how chromium, and other metals, is modeled in the water quality models and report back to the SAG with its findings.
- ❖ MDE will review the relationship between the specific compounds being modeled and how they are incorporated into the permit writing process.

Scheduled Meetings: All Meetings Scheduled to be held at the MDE offices at Montgomery Park

April 9, 2003 – Technical Outreach Meeting MDE
May 1, 2003 – General Outreach Meeting
June 10, 2003 – General Outreach Meeting

July 30, 2003 – General Outreach Meeting
Other technical meetings will be scheduled as needed